

REMARKS

This Amendment is in response to the Office Action mailed on April 14, 2010. Claims 13, 15, 16, and 18 have been amended. The amendments are supported throughout the specification. For example, see paragraph [0002] (explaining that a disclosed method is used to supply metered quantities of liquids), paragraphs [0005], [0006], and [0010] (describing the disclosed control method is not dependent on the load on the motor), paragraphs [0014], [0022], [0042-0046], and FIGS. 2 and 3 (describing that an embodiment of the disclosed method involves varying the rotation speed of the motor during compression to maintain a constant fluid delivery rate and to maximize the rotation speed during aspiration to minimize the gap in time between compression strokes), and paragraphs [0024] and [0047] of the PG PUB (describing that an embodiment of the disclosed method involves increasing the linear speed of the ram to increase the flow rate just before the end of the compression cycle to compensate for gap between compression cycles).

No new matter has been added. Applicants reserve the right to prosecute the same or similar claims in the present or another patent application. The amendments made are not related to any issues of patentability. Applicants submit that the pending claims are in condition for allowance.

I. Rejections under 35 U.S.C. § 112

A. Claims 7, 12, 13 and 18 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. This rejection is traversed.

Regarding claims 7, 12, and 13, the Office Action objected to the phrase “only if” in independent claim 13. To advance the application to issuance, the phrase has been removed rendering this rejection to claims 7, 12 and 13 moot.

Regarding claim 18, the Office Action states that the phrase “increase linear speed of the ram” lacks support. Applicants note that the specification explains that increasing the rotational

speed of the motor increases the linear speed of the ram and results in an increase in flow rate. However, to advance the application to issuance, the phrase has been removed rendering this rejection to claim 18 moot.

B. Claims 7, 12, 13 and 15-20 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. This rejection is traversed.

Regarding claims 7, 12, and 13 the Office Action states that the phrase in claim 13, “providing input of a required quantity. . . the required quantity being that to be delivered during the compression stroke of the metering cycle...” is unclear. To advance the application to issuance, the above clause has been amended to clarify that the providing step relates to inputting the desired amount of meter medium to be pumped. An object of the present disclosure is to provide a method that enables the delivery of precise amounts of liquid. See paragraphs [0002]. The amendment clarifies that the desired amount of liquid to be metered could be more or less than the amount that the pump can deliver via a single compression stroke. Applicants request reconsideration of this rejection.

Regarding claims 15-20, the Office Action states that claim 15 positively recites “a compression stroke.” The compression stroke is described in detail at paragraphs [0003], [0012-0017], [0020], [0022-0024], [0041-0047] and shown in FIG. 2. The “a compression stroke” clearly refers to the pump stroke that pumps liquid that is opposite the aspiration stroke. Applicants request reconsideration of this rejection.

II. Rejections under 35 U.S.C. § 103

A. Claims 7, 12, and 13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Haberlander et al. (US 6457944) in view of Moddemann (US 2002/0067148). Applicants respectfully traverse this rejection.

Claim 13 refers to a method for controlling a metering cycle of a pump, the pump including a diaphragm coupled to a ram, the ram being moved by a cam, which is rotated by a

shaft of an electric motor, in order to displace the diaphragm in a first direction, for a compression stroke of the metering cycle, and then in a second direction for an aspiration stroke of the metering cycle, the method comprising:

providing input of a required quantity of a metered medium to a positional controller that is coupled to a controller of the electric motor;
providing input of a current position of the rotating cam to the positional controller;
calculating a currently required rotating speed for the motor based upon the input of the required quantity of the metered medium and the current position of the rotating cam;
transmitting, from the positional controller to the controller of the motor, the calculated currently required rotating speed of the motor, the motor being an EC motor; and
adjusting a rotating field inside the motor to reach the calculated currently required rotating speed, the adjusting being carried out by the controller of the motor during the compression stroke of the metering cycle; and
wherein the rotation speed varies during substantially the entire duration of the compression stroke to maintain a substantially constant rate of delivery of the metered medium and
wherein the rotational speed during substantially the entire duration of the aspiration stroke is constant and at the maximum rotation speed of the motor.

The Office Action stated that “with respect to obviousness of claim 13, the Examiner again points out that the claim does not require varying the motor speed with a single stroke, even if the speed calculation is only preformed during the aspiration stroke.” To address this issue, claim 13 has been amended to clarify that the rotation speed varies during substantially the entire duration of the compression stroke to maintain a substantially constant rate of delivery of the metered medium and wherein the rotational speed during substantially the entire duration of the aspiration stroke is constant and at the maximum rotation speed of the motor. Accordingly, claim 13 is not obvious for the reasons set forth in the Amendment filed on February 24, 2010; relevant portion of the February 24 amendment are included below.

None of the cited references disclose or suggest the above claim step (i.e., varying the motor speed during a compression stroke of a pump). Haberlander et al. merely discloses running a motor faster during aspiration than during compression. Haberlander et al. is equivalent to DE 198 23 156, which is referenced in context in the background of the present application. As discussed in paragraph [0010] of the published application, the disclosure of Haberlander et al. is directed to asynchronous motors, which have very different characteristics than EC motors (e.g. asynchronous motors are load dependent), and therefore is not applicable to the new pump method disclosed in the present application. The new pump method involves varying the speed of a motor during the compression stroke to maintain a substantially constant flow rate (as described in the specification, flow rate is proportional to ram speed).

Moddemann fails to cure the defects of Haberlander et al. Moddemann does not disclose varying the speed of a motor during a compression stroke of a pump, it simply discloses a motor. Therefore, even if Moddemann and Haberlander et al. were combined, the combination would not include all of the features of claim 13.

The Office Action states that EC motors and asynchronous motors are substitutable as they both are electric motors capable of position and speed control. As discussed at paragraphs [0004-0006], and [0010], EC motors and asynchronous motors are controlled very differently. As discussed at paragraph [0010] of the present application, the prior art uses asynchronous motors and as a result require cumbersome control systems. As discussed at paragraphs [0004-0005] one of ordinary skill in the art did not think that EC motors would work well in the claimed context.

In particular, in view of the fact that the motor of Moddemann is used in an entirely different context and the disclosure in Haberlander et al. is very specific to the use of an asynchronous motor, one of ordinary skill in the art would not have combined the teachings from the references. See “Field of Invention” and “Abstract” sections of Haberlander et al. explaining that the disclosure relates to asynchronous motor driven pumps.

Claims 7 and 12 depend on and further limit claim 13, therefore, they are not obvious for at least the same reasons. Accordingly, Applicants request that this rejection be withdrawn.

B. Claims 15-20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Haberlander et al. in view of Moddemann, Llewellyn (GB 2130305) and Takahashi et al. (US 5664937). Applicants respectfully traverse this rejection.

Claim 15 is directed at a method for controlling a ram actuated diaphragm pump comprising: providing an electronically commuted motor for driving linear reciprocation of a ram in a first direction corresponding to a compression stroke and a second direction corresponding to an aspiration stroke; varying a rotational speed of the commuted motor to maintain a substantially constant linear speed of the ram during substantially the entire duration of a compression stroke. The cited prior art fails to disclose or suggest the above method.

As stated on page 7 of the Office Action, “Haberlander et al. does not teach varying the rotating speed of the cam during a compression stroke of the pump.” Llewellyn and Takahashi also fail to disclose the missing feature.

Llewellyn is directed to a hydraulic pump with a center cam shaft and four pistons arranged around the shaft. When the shaft rotates the pistons directly pump fluid. In contrast, the present disclosure relates to a method of controlling a ram actuated diaphragm pump that involves varying the speed of a motor so that a ram that drives a diaphragm of a pump moves at a constant linear velocity. The piston of Llewellyn is part of the pump itself and is not equivalent to the claimed ram which drives the pump. Takahashi et al. is also not directed to the claim method involving a ram actuated diaphragm pump and control of the ram via control of a motor that drives the ram. Accordingly, claim 15 is not obvious.

Claims 16-20 depend on and further limit claim 15, therefore, they are not obvious for at least the same reasons.

In addition, claim 16 is not obvious further because it is directed to a method wherein the rotational speed of the commuted motor is varied based in part on a sensed rotor position and a sensed cam position and is independent from the load on the motor. As discussed above, Haberlander et al is directed to an asynchronous motor driven pump. The control of asynchronous motors is dependent on the load on the motor. See present application at paragraphs [0006] and [0010].

In addition, claim 18 is not obvious further because it is directed to a method, wherein the rotational speed of the motor is increased shortly before the end of the compression stroke to compensate for the metering gap during the aspiration stroke. As discussed in the specification (e.g., paragraphs [0014], [0022], [0024], and [0042-0047]), in the depicted embodiment the pumping action occurs during the compression stroke rather than during the aspiration stroke. Therefore, there is a gap in time between compression strokes wherein no liquid is being pumped. It is desirable to pump liquid as continuously as possible so the pumping speed (flow rate, rate of motor rotation, rate of ram, which are all tied) is increased just before the end of the compression stroke to compensate for the fact that no flow occurs during the short aspiration stroke. As a result, the flow is more continuous than it otherwise would be. The cited art fails to disclose this step, therefore, claim 18 is not obvious for this additional reason. Accordingly, Applicants respectfully request that this rejection be withdrawn.

Conclusion

In view of the above amendments and remarks, Applicants respectfully request a Notice of Allowance. If the Examiner believes a telephone conference would advance the prosecution of this application, the Examiner is invited to telephone the undersigned at the below-listed telephone number.

Please consider this a PETITION FOR EXTENSION OF TIME for a sufficient number of months to enter these papers or any future reply, if appropriate. Please charge any additional fees or credit overpayment to Deposit Account No. 13-2725.

Respectfully submitted,

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